E 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[RTID 0648-XC223]

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to the Office of Naval Research's Arctic Research Activities in the Beaufort and Chukchi Seas (Year 5)

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of an incidental harassment authorization.

SUMMARY: In accordance with the regulations implementing the Marine Mammal Protection Act (MMPA) as amended, notification is hereby given that NMFS has issued an incidental harassment authorization (IHA) to the Office of Naval Research (ONR) to incidentally harass, by Level B harassment only, marine mammals during active acoustic testing associated with Arctic Research Activities (ARA) in the Beaufort Sea and eastern Chukchi Sea. The ONR's activities are considered military readiness activities pursuant to the MMPA, as amended by the National Defense Authorization Act for Fiscal Year (FY) 2004 (2004 NDAA).

DATES: This Authorization is effective from September 14, 2022 through September 13, 2023.

FOR FURTHER INFORMATION CONTACT: Jessica Taylor, Office of Protected Resources, NMFS, (301) 427-8401. Electronic copies of the application and supporting documents, as well as a list of the references cited in this document, may be obtained online at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities*. In case of problems accessing these documents, please call the contact listed above.

SUPPLEMENTARY INFORMATION:

Background

The MMPA prohibits the "take" of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are proposed or, if the taking is limited to harassment, a notice of a proposed IHA is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other "means of effecting the least practicable adverse impact" on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for taking for certain subsistence uses (referred to in shorthand as "mitigation"), and requirements pertaining to the mitigation, monitoring and reporting of the takings are set forth.

The 2004 NDAA (Pub. L. 108–136) removed the "small numbers" and "specified geographical region" limitations indicated above and amended the definition of "harassment" as applied to a "military readiness activity." The activity for which incidental take of marine mammals is being authorized addressed here qualifies as a military readiness activity. The definitions of all applicable MMPA statutory terms cited above are included in the relevant sections below.

Summary of Request

On March 21, 2022, NMFS received a request from ONR for an IHA to take marine mammals incidental to ARA in the Beaufort and eastern Chukchi Seas. The application was deemed adequate and complete on June 30, 2022. ONR's request is for take of beluga whales (*Delphinapterus leucas;* two stocks) and ringed seals (*Pusa hispida hispida*) by Level B harassment. Neither ONR nor NMFS expect serious injury or mortality to result from this activity and, therefore, an IHA is appropriate.

This IHA covers the fifth year of a larger project for which ONR obtained prior IHAs (83 FR 48799, September 27, 2018; 84 FR 50007, September 24, 2019; 85 FR 53333, August 28, 2020; 86 FR 54931, October 5, 2021) and may request take authorization for subsequent facets of the overall project. This IHA is valid for a period of 1 year from the date of issuance. The larger project supports the development of an under-ice navigation system under the ONR Arctic Mobile Observing System (AMOS) project. ONR has complied with all the requirements (*e.g.,* mitigation, monitoring, and reporting) of the previous IHAs (83 FR 48799, September 27, 2018; 84 FR 50007, September 24, 2019; 85 FR 53333, August 28, 2020; 86 FR 54931, October 5, 2021).

Description of Specified Activity

Overview

ONR's ARA include scientific experiments to be conducted in support of the programs named above. Specifically, the project includes the AMOS experiments in the Beaufort and Chukchi Seas. Project activities involve acoustic testing and a multi-frequency navigation system concept test using left-behind active acoustic sources. More specifically, these experiments involve the deployment of moored, drifting, and ice-tethered active acoustic sources from the Research Vessel (R/V) *Sikuliaq*. Another vessel will be used to retrieve the acoustic sources. Underwater sound from the acoustic sources may result in Level B harassment of marine mammals.

Dates and Duration

This action will occur from mid- September 2022 through mid- September 2023. The 2022 cruise will leave from Nome, Alaska on September 14, 2022 using the R/V *Sikuliaq* and involve 120 hours of active source testing. During this first cruise, several acoustic sources will be deployed from the ship. Some acoustic sources will be left behind to provide year-round observation of the Arctic environment. Gliders deployed during the September 2022 cruise may be recovered before the research vessel departs the study area or during the September 2023 cruise. Up to seven fixed acoustic navigation sources transmitting at 900 hertz (Hz) will remain in place for a year. Drifting and moored oceanographic sensors will record environmental parameters throughout the year. Autonomous weather stations and ice mass balance buoys will also be deployed to record environmental measurements throughout the year (Table 1). The research vessel is planned to return to Nome, Alaska on October 28, 2022. ONR will apply for a renewal or separate IHA for activities conducted during the planned September 2023 cruise.

During the scope of this project, other activities may occur at different intervals that will assist ONR in meeting the scientific objectives of the various projects discussed above. However, these activities are designated as de minimis sources in ONR's 2022-2023 IHA application (consistent with analyses presented in support of previous Navy ONR IHAs), or will not produce sounds detectable by marine mammals (see discussion on de minimis sources below).These include the deployment of a Woods Hole Oceanographic Institution (WHOI) micromodem, acoustic Doppler current profilers (ADCP), and ice profilers (Table 2).

Geographic Region

This action will occur across the U.S. Exclusive Economic Zone (EEZ) in both the Beaufort and Chukchi Seas, partially in the high seas north of Alaska, the Global Commons, and within a part of the Canadian EEZ (in which the appropriate permits will be obtained by the Navy) (Figure 1). The action will primarily occur in the Beaufort Sea,

but the analysis considers the drifting of active sources on buoys into the eastern portion of the Chukchi Sea. The closest point of the study area to the Alaska coast is 110 nautical miles (nm) (204 km). The study area is approximately 639,267 km^2.

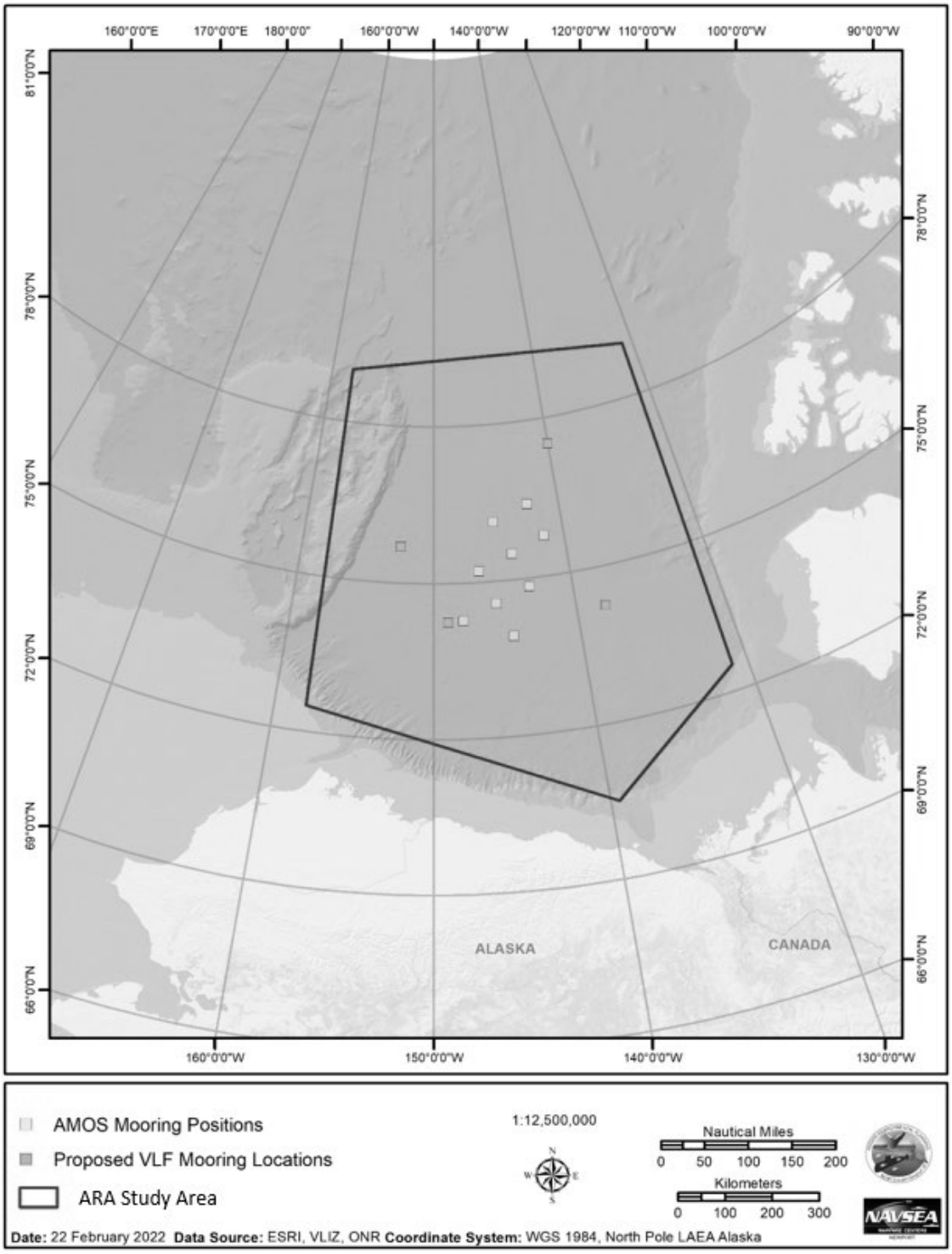

Figure 1. ONR ARA Study Area and Fixed Source Locations

Detailed Description of Specific Activity

The ONR Arctic and Global Prediction Program supports two major projects: Stratified Ocean Dynamics of the Arctic (SODA) and AMOS. The SODA and AMOS projects have been previously discussed in association with previously issued IHAs (83 FR 40234, August 14, 2018; 84 FR 37240, July 31, 2019). However, only activities relating to the AMOS project will occur during the period covered by this action.

The AMOS project constitutes the development of a new system involving very low (35 hertz (Hz)), low (900 Hz), and mid-frequency transmissions (10 kilohertz (kHz)). The AMOS project will utilize acoustic sources and receivers to provide a means of performing under-ice navigation for gliders and unmanned underwater vehicles (UUVs). This will allow for the possibility of year-round scientific observations of the environment in the Arctic. As an environment that is particularly affected by climate change, year-round observations under a variety of ice conditions are required to study the effects of this changing environment for military readiness, as well as the implications of environmental change to humans and animals. Very-low frequency technology is important in extending the range of navigation systems. The technology also has the potential to allow for development and use of navigational systems that would not be heard by some marine mammal species, and therefore would be less impactful overall.

Active acoustic sources will be lowered from the cruise vessel while stationary, deployed on gliders and UUVs, or deployed on fixed AMOS moorings. This project will use groups of drifting buoys with sources and receivers communicating oceanographic information to a satellite in near real time. These sources will employ low-frequency transmissions only (900 Hz).

The action will utilize non-impulsive acoustic sources, although not all sources will cause take of marine mammals. Any marine mammal takes will only arise from the

operation of non-impulsive active sources. Although not currently planned, icebreaking could occur as part of this action if a research vessel needs to return to the study area before the end of the IHA period to ensure scientific objectives are met. In this case, icebreaking could result in potential Level B harassment takes.

Below are descriptions of the equipment and platforms that will be deployed at different times during the authorized action.

Research Vessels

The R/V *Sikuliaq* will perform the research cruise in September 2022 and conduct testing of acoustic sources during the cruise, as well as leave sources behind to operate as a year-round navigation system observation. R/V *Sikuliaq* has a maximum speed of approximately 12 knots (6.2 m/s) with a cruising speed of 11 knots (5.7 m/s) (University of Alaska Fairbanks, 2014). The R/V *Sikuliaq* is not an ice breaking ship, but an ice strengthened ship. It will not be icebreaking and therefore acoustic signatures of icebreaking for the R/V *Sikuliaq* are not relevant.

The ship to be used in September 2023 to retrieve any acoustic sources could potentially be the Coast Guard Cutter (CGC) *Healy*. CGC *Healy* travels at a maximum speed of 17 knots (8.7 m/s) with a cruising speed of 12 knots (6.2 m/s) (United States Coast Guard, 2013), and a maximum speed of 3 knots (1.5 m/s) when traveling through 4.5 feet (1.07 m) of sea ice (United States Coast Guard, 2013). While no icebreaking cruise on the CGC *Healy* is scheduled during the IHA period, need may arise. Therefore, for the purposes of this IHA application, an icebreaking cruise is considered.

The R/V *Sikuliaq*, CGC *Healy*, or any other vessel operating a research cruise associated with this action may perform the following activities during their research cruises:

- Deployment of moored and/or ice-tethered passive sensors (oceanographic measurement devices, acoustic receivers);

- Deployment of moored and/or ice-tethered active acoustic sources to transmit acoustic signals;
- Deployment of UUVs;
- Deployment of drifting buoys, with or without acoustic sources; or,
- Recovery of equipment.

Moored and Drifting Acoustic Sources

During the September 2022 cruise, active acoustic sources will be lowered from the cruise vessel while stationary, deployed on gliders and UUVs, or deployed on fixed AMOS moorings. This will be done for intermittent testing of the system components. The total amount of active source testing for ship-deployed sources used during the cruise will be 120 hours. The testing will take place near the seven source locations on Figure 1, with UUVs running tracks within the designated box. During this testing, 35 Hz, 900 Hz, and 10 kHz acoustic signals, as well as acoustic modems will be employed.

Up to seven fixed acoustic navigation sources transmitting at 900 Hz will remain in place for a year and continue transmitting during this time. These moorings will be anchored on the seabed and held in the water column with subsurface buoys. All sources will be deployed by shipboard winches, which will lower sources and receivers in a controlled manner. Anchors will be steel "wagon wheels" typically used for this type of deployment. Two very low frequency (VLF) sources transmitting at 35 Hz will be deployed in a similar manner. Two Ice Gateway Buoys (IGB) will also be configured with active acoustic sources. Autonomous vehicles will be able to navigate by receiving acoustic signals from multiple locations and triangulating. This is needed for vehicles that are under ice and cannot communicate with satellites. Source transmits will be offset by 15 minutes from each other (*i.e.,* sources will not be transmitting at the same time). All navigation sources will be recovered. The purpose of the navigation sources is to orient UUVs and gliders in situations when they are under ice and cannot communicate with

satellites. For the purposes of this action, activities potentially resulting in take will not be included in the fall 2023 cruise; a subsequent application will be provided by ONR depending on the scientific plan associated with that cruise.

Table 1 -- Characteristics for the modeled acoustic sources for the action

Platform	Acoustic Source	Purpose/Function	Frequency	Signal Strength (dB re1uPa @ 1m)[1]	Band Width
REMUS 600 UUV (1)	WHOI[2]/Micro-modem	Acoustic communication	900-950 Hz[3]	NTE[3] 180 dB by sys design limits	50 Hz
	UUV/WHOI Micro-modem	Acoustic communication	8-14 kHz[3]	NTE 185 dB by sys design limits	5 kHz
IGB[3] (drifting) (2)	WHOI Micro-modem	Acoustic communication	900-950 Hz	NTE 180 dB by sys design limits	50 Hz
	WHOI Micro-modem	Acoustic communication	8-14 kHz	NTE 185 dB by sys design limits	5 kHz
Mooring (9)	WHOI Micro-modem (7)	Acoustic navigation	900-950 Hz	NTE 180 dB by sys design limits	50 Hz
	VLF[3] (2)	Acoustic navigation	35 Hz	NTE 190 dB	6 Hz

[1] dB re 1 µPa at 1 m= decibels referenced to 1 micropascal at 1 meter.
[2] WHOI = Woods Hole Oceanographic Institution.
[3] Hz= Hertz; IGB= Ice Gateway Buoy; kHz= 1 kilohertz; NTE= not to exceed; VLF= very low frequency

Activities not likely to result in take

The following in-water activities have been determined to be unlikely to result in take of marine mammals. These activities are described here but they are not discussed further in this document.

De minimis Sources— De minimis sources have the following parameters: Low source levels, narrow beams, downward directed transmission, short pulse lengths, frequencies outside known marine mammal hearing ranges, or some combination of these factors (Department of the Navy, 2013). The following are some of the planned de minimis sources which will be used during this action: WHOI micromodem, ADCPs, ice

profilers, and additional sources below 160 dB re 1 µPa used during towing operations. ADCPs may be used on moorings. Ice-profilers measure ice properties and roughness. The ADCPs and ice-profilers will all be above 200 kHz and therefore out of marine mammal hearing ranges, with the exception of the 75 kHz ADCP which has the characteristics and de minimis justification listed in Table 2. They may be employed on moorings or UUVs. Descriptions of some de minimis sources are discussed below and in Table 2. More detailed descriptions of these de minimis sources can be found in ONR's IHA application under Section 1.1.1.2.

Table 2 -- Parameters for de minimis non-impulsive active sources

Source Name	Frequency Range (kHz)	Sound Pressure Level (dB re 1 µPa at 1 m)	Pulse Length (s)	Duty Cycle (percent)	De minimis Justification
ADCP	>200, 150, or 75	190	<0.001	<0.1	Very low pulse length, narrow beam, moderate source level
Nortek Signature 500 kHz Doppler Velocity Log	500	214	<0.1	<13	Very high frequency
CTD[1] Attached Echosounder	5-20	160	0.004	2	Very low source level

[1] Conductivity Temperature Depth

Drifting Oceanographic Sensors

Observations of ocean-ice interactions require the use of sensors that are moored and embedded in the ice. For this action, it will not be required to break ice to do this, as deployments can be performed in areas of low ice-coverage or free floating ice. Sensors are deployed within a few dozen meters of each other on the same ice floe. Three types of sensors will be used: autonomous ocean flux buoys, Integrated Autonomous Drifters, and ice-tethered profilers. The autonomous ocean flux buoys measure oceanographic

properties just below the ocean-ice interface. The autonomous ocean flux buoys will have ADCPs and temperature chains attached, to measure temperature, salinity, and other ocean parameters in the top 20 ft (6 m) of the water column. Integrated Autonomous Drifters will have a long temperate string extending down to 656 ft (200 m) depth and will incorporate meteorological sensors, and a temperature spring to estimate ice thickness. The ice-tethered profilers will collect information on ocean temperature, salinity and velocity down to 820 ft (250 m) depth.

Up to 20 Argo-type autonomous profiling floats may be deployed in the central Beaufort Sea. Argo floats drift at 4,921 ft (1,500 m) depth, profiling from 6,562 ft (2,000 m) to the sea surface once every 10 days to collect profiles of temperature and salinity.

Moored Oceanographic Sensors

Moored sensors will capture a range of ice, ocean, and atmospheric conditions on a year-round basis. These will be bottom anchored, sub-surface moorings measuring velocity, temperature, and salinity in the upper 1,640 ft (500 m) of the water column. The moorings also collect high-resolution acoustic measurements of the ice using the ice profilers described above. Ice velocity and surface waves will be measured by 500 kHz multibeam sonars from Nortek Signatures. The moored oceanographic sensors described above use only de minimis sources and are therefore not anticipated to have the potential for impacts on marine mammals or their habitat.

On-Ice Measurements

On-ice measurement systems will be used to collect weather data. These will include an Autonomous Weather Station and an Ice Mass Balance Buoy. The Autonomous Weather Station will be deployed on a tripod; the tripod has insulated foot platforms that are frozen into the ice. The system will consist of an anemometer, humidity sensor, and pressure sensor. The Autonomous Weather Station also includes an altimeter that is de minimis due to its very high frequency (200 kHz). The Ice Mass

Balance Buoy is a 20 ft (6 m) sensor string, which is deployed through a 2 inch (5 cm) hole drilled into the ice. The string is weighted by a 2.2 lb (1 kg) lead weight, and is supported by a tripod. The buoy contains a de minimis 200 kHz altimeter and snow depth sensor. Autonomous Weather Stations and Ice Mass Balance Buoys will be deployed, and will drift with the ice, making measurements, until their host ice floes melt, thus destroying the instruments (likely in summer, roughly one year after deployment). After the on-ice instruments are deployed they cannot be recovered, and will sink to the seafloor as their host ice floes melted.

Mitigation, monitoring, and reporting measures are described in detail later in this document (please see **Mitigation** and **Monitoring and Reporting**).

Comments and Responses

A notice of NMFS's proposal to issue an IHA to ONR was published in the **Federal Register** on July 25, 2022 (87 FR 44339). That notice described, in detail, ONR's activity, the marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals. During the 30-day public comment period, NMFS received one non-substantive public comment that did not present relevant information and did not change our determinations or any aspects of the IHA as described in the proposed **Federal Register** notice (87 FR 44339, July 25, 2022).

Changes from Proposed IHA to Final IHA

There were no changes from the proposed IHA to the final IHA.

Description of Marine Mammals in the Area of Specified Activities

Sections 3 and 4 of the application summarize available information regarding status and trends, distribution and habitat preferences, and behavior and life history of the potentially affected species. NMFS fully considered all of this information, and we refer the reader to these descriptions, incorporated here by reference, instead of reprinting the information. Additional information regarding population trends and threats may be

found in NMFS' Stock Assessment Reports (SARs; *www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*) and more general information about these species (*e.g.*, physical and behavioral descriptions) may be found on NMFS' website (*https://www.fisheries.noaa.gov/find-species)*.

Table 3 lists all species or stocks for which take is expected and authorized for this action, and summarizes information related to the population or stock, including regulatory status under the MMPA and Endangered Species Act (ESA) and potential biological removal (PBR), where known. PBR is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (as described in NMFS' SARs). While no serious injury or mortality is anticipated or authorized here, PBR and annual serious injury and mortality from anthropogenic sources are included here as gross indicators of the status of the species and other threats.

Marine mammal abundance estimates presented in this document represent the total number of individuals that make up a given stock or the total number estimated within a particular study or survey area. NMFS' stock abundance estimates for most species represent the total estimate of individuals within the geographic area, if known, that comprises that stock. For some species, this geographic area may extend beyond U.S. waters. All managed stocks in this region are assessed in NMFS' U.S. 2021 SARs (*e.g.*, Muto *et al.,* 2022). All values presented in Table 3 are the most recent available at the time of publication and are available in the 2021 SARs (Muto *et al.,* 2022).

Table 3 – Marine Mammal Species[6] Likely Impacted by the Specified Activities

Common name	Scientific name	Stock	ESA/MMPA status; Strategic (Y/N)[1]	Stock abundance (CV, Nmin, most recent abundance survey)[2]	PBR	Annual M/SI[3]
Order Artiodactyla – Infraorder Cetacea– Odontoceti (toothed whales, dolphins, and porpoises)						

Family Monodontidae						
Beluga Whale	*Delphinapterus leucas*	Beaufort Sea	-, -, N	39,258 (0.229, N/A, 1992)	UND[4]	104
Beluga Whale	*Delphinapterus leucas*	Eastern Chukchi Sea	-, -, N	13,305 (0.51, 8,875, 2012)	178	55
Order Carnivora – Pinnipedia						
Family Phocidae (earless seals)						
Ringed Seal[5]	*Pusa hispida hispida*	Arctic	T, D, Y	171,418 (N/A, 158,507, 171,418	5,100	6,459

[1] Endangered Species Act (ESA) status: Endangered (E), Threatened (T)/MMPA status: Depleted (D). A dash (-) indicates that the species is not listed under the ESA or designated as depleted under the MMPA. Under the MMPA, a strategic stock is one for which the level of direct human-caused mortality exceeds PBR or which is determined to be declining and likely to be listed under the ESA within the foreseeable future. Any species or stock listed under the ESA is automatically designated under the MMPA as depleted and as a strategic stock.
[2] NMFS marine mammal stock assessment reports online at: www.nmfs.noaa.gov/pr/sars/. CV is coefficient of variation; Nmin is the minimum estimate of stock abundance. In some cases, CV is not applicable [explain if this is the case].
[3] These values, found in NMFS's SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (e.g., commercial fisheries, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a minimum value or range. A CV associated with estimated mortality due to commercial fisheries is presented in some cases.
[4] The 2016 guidelines for preparing SARs state that abundance estimates older than 8 years should not be used to calculate PBR due to a decline in the reliability of an aged estimate. Therefore, the PBR for this stock is considered undetermined (UND).
[5] Abundance and associated values for ringed seals are for the U.S. population in the Bering Sea only.
[6] Information on the classification of marine mammal species can be found on the web page for The Society for Marine Mammalogy's Committee on Taxonomy (*https://marinemammalscience.org/science-and-publications/list-marine-mammal-species-subspecies/;* Committee on Taxonomy (2022)).

As indicated above, the two species (with three managed stocks) in Table 3 temporally and spatially co-occur with the activity to the degree that take is reasonably likely to occur. While bowhead whales (*Balaena mysticetus*), gray whales (*Eschrichtius robustus*), bearded seals (*Erignathus barbatus*), spotted seals (*Phoca largha*), ribbon seals (*Histiophoca fasciata*), have been documented in the area, the temporal and/or spatial occurrence of these species is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here.

Due to the location of the study area (*i.e.,* northern offshore, deep water), there were no calculated exposures for the bowhead whale, gray whale, spotted seal, bearded seal, and ribbon seal from quantitative modeling of acoustic sources. Bowhead and gray whales are closely associated with the shallow waters of the continental shelf in the Beaufort Sea and are unlikely to be exposed to acoustic harassment (Carretta *et al.,* 2018;

Muto *et al.,* 2018). Similarly, spotted seals tend to prefer pack ice areas with water depths less than 200 m during the spring and move to coastal habitats in the summer and fall, found as far north as 69-72° N (Muto *et al.,* 2018). Although the study area includes some waters south of 72° N, the acoustic sources with the potential to result in take of marine mammals are not found below that latitude and spotted seals are not expected to be exposed. Ribbon seals are found year-round in the Bering Sea but may seasonally range into the Chukchi Sea (Muto *et al.,* 2018). The authorized action occurs primarily in the Beaufort Sea, outside of the core range of ribbon seals, thus ribbon seals are not expected to be behaviorally harassed. Narwhals (*Monodon monoceros*) are considered extralimital in the project area and are not expected to be encountered. As no harassment is expected of the bowhead whale, gray whale, spotted seal, bearded seal, narwhal, and ribbon seal, these species will not be discussed further in this notice.

A detailed description of the species likely to be affected by the ONR ARA, including brief introductions to the species and relevant stocks, as well as available information regarding population trends and threats, and information regarding local occurrence, were provided in the **Federal Register** notice for the proposed IHA (87 FR 44339, July 25, 2022); since that time, we are not aware of any changes in the status of these species and stocks. Therefore, detailed descriptions are not provided here. Please refer to that **Federal Register** notice for these descriptions. Please also refer to NMFS's website (*http://www.fisheries.noaa.gov/find-species*) for generalized species accounts.

Marine Mammal Hearing

Hearing is the most important sensory modality for marine mammals underwater, and exposure to anthropogenic sound can have deleterious effects. To appropriately assess the potential effects of exposure to sound, it is necessary to understand the frequency ranges marine mammals are able to hear. Not all marine mammal species have equal hearing capabilities (*e.g.*, Richardson *et al.*, 1995; Wartzok and Ketten, 1999; Au

and Hastings, 2008). To reflect this, Southall *et al.* (2007, 2019) recommended that marine mammals be divided into hearing groups based on directly measured (behavioral or auditory evoked potential techniques) or estimated hearing ranges (behavioral response data, anatomical modeling, *etc.*). Note that no direct measurements of hearing ability have been successfully completed for mysticetes (*i.e.*, low-frequency cetaceans). Subsequently, NMFS (2018) described generalized hearing ranges for these marine mammal hearing groups. Generalized hearing ranges were chosen based on the approximately 65 decibel (dB) threshold from the normalized composite audiograms, with the exception for lower limits for low-frequency cetaceans where the lower bound was deemed to be biologically implausible and the lower bound from Southall *et al.* (2007) retained. Marine mammal hearing groups and their associated hearing ranges are provided in Table 4.

Table 4 -- Marine Mammal Hearing Groups (NMFS, 2018)

Hearing Group	Generalized Hearing Range*
Low-frequency (LF) cetaceans (baleen whales)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	150 Hz to 160 kHz
High-frequency (HF) cetaceans (true porpoises, *Kogia*, river dolphins, Cephalorhynchid, *Lagenorhynchus cruciger* & *L. australis*)	275 Hz to 160 kHz
Phocid pinnipeds (PW) (underwater) (true seals)	50 Hz to 86 kHz
Otariid pinnipeds (OW) (underwater) (sea lions and fur seals)	60 Hz to 39 kHz
* Represents the generalized hearing range for the entire group as a composite (*i.e.*, all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 dB threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al*., 2007) and PW pinniped (approximation).	

The pinniped functional hearing group was modified from Southall *et al*. (2007) on the basis of data indicating that phocid species have consistently demonstrated an extended frequency range of hearing compared to otariids, especially in the higher frequency range (Hemilä *et al*., 2006; Kastelein *et al*., 2009; Reichmuth and Holt, 2013).

For more detail concerning these groups and associated frequency ranges, please see NMFS (2018) for a review of available information.

Potential Effects of Specified Activities on Marine Mammals and their Habitat

The effects of underwater noise from ONR's ARA have the potential to result in behavioral harassment of marine mammals in the vicinity of the survey area. The notice of the proposed IHA (87 FR 44339, July 25, 2022) included a discussion of the effects of anthropogenic noise ONR's ARA on marine mammals and their habitat. That information and analysis is incorporated by reference into this final IHA determination and is not repeated here; please refer to the notice of proposed IHA (87 FR 44339, July 25, 2022).

Estimated Take

This section provides an estimate of the number of incidental takes authorized through this IHA, which will inform both NMFS' consideration of "small numbers" and the negligible impact determinations.

Harassment is the only type of take expected to result from these activities. For this military readiness activity, the MMPA defines "harassment" as (i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where the behavioral patterns are abandoned or significantly altered (Level B harassment).

Authorized takes will be by Level B harassment only, in the form of disruption of behavioral patterns and/or temporary threshold shift (TTS) for individual marine mammals resulting from exposure to ONR's acoustic sources. Based on the nature of the activity, Level A harassment is neither anticipated nor authorized.

As described previously, no serious injury or mortality has been authorized for this activity. Below we describe how the authorized take numbers are estimated.

For acoustic impacts, generally speaking, we estimate take by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day; (3) the density or occurrence of marine mammals within these ensonified areas; and, (4) the number of days of activities. We note that while these factors can contribute to a basic calculation to provide an initial prediction of potential takes, additional information that can qualitatively inform take estimates is also sometimes available (*e.g.,* previous monitoring results or average group size). ONR employed an advanced model known as the Navy Acoustic Effects Model (NAEMO) for assessing the impacts of underwater sound. Below, we describe the factors considered here in more detail and present the authorized take estimates.

Acoustic Thresholds

NMFS recommends the use of acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed (equated to Level B harassment) or to incur a permanent threshold shift (PTS) of some degree (equated to Level A harassment).

Level B Harassment – Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source or exposure context (*e.g.*, frequency, predictability, duty cycle, duration of the exposure, signal-to-noise ratio, distance to the source), the environment (*e.g.*, bathymetry, other noises in the area, predators in the area), and the receiving animals (hearing, motivation, experience, demography, life stage, depth) and can be difficult to predict (*e.g.*, Southall *et al.,* 2007, 2021; Ellison *et al.*,

2012). Based on what the available science indicates and the practical need to use a threshold based on a metric that is both predictable and measurable for most activities, NMFS typically uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS generally predicts that marine mammals are likely to be behaviorally harassed in a manner considered to be Level B harassment when exposed to underwater anthropogenic noise above root-mean-squared pressure received levels (RMS SPL) of 120 dB (referenced to 1 micropascal (re 1 μPa)) for continuous (*e.g.,* vibratory pile-driving, drilling) and above RMS SPL 160 dB re 1 μPa (rms) for non-explosive impulsive (*e.g.*, seismic airguns) or intermittent (*e.g.*, scientific sonar) sources.

In this case, NMFS is adopting the Navy's approach to estimating incidental take by Level B harassment from the active acoustic sources for this action, which includes use of dose response functions. The Navy's dose response functions were developed to estimate take from sonar and similar transducers, but are not applicable to icebreaking. Multi-year research efforts have conducted sonar exposure studies for odontocetes and mysticetes (Miller *et al.,* 2012; Sivle *et al.,* 2012). Several studies with captive animals have provided data under controlled circumstances for odontocetes and pinnipeds (Houser *et al.,* 2013a; Houser *et al.,* 2013b). Moretti *et al.* (2014) published a beaked whale dose-response curve based on passive acoustic monitoring of beaked whales during a U.S. Navy training activity at Atlantic Underwater Test and Evaluation Center during actual Anti-Submarine Warfare exercises. This information necessitated the update of the behavioral response criteria for the U.S. Navy's environmental analyses.

Southall *et al.* (2007), and more recently Southall *et al.* (2019), synthesized data from many past behavioral studies and observations to determine the likelihood of behavioral reactions at specific sound levels. While in general, the louder the sound source the more intense the behavioral response, it was clear that the proximity of a

sound source and the animal's experience, motivation, and conditioning were also critical factors influencing the response (Southall *et al.,* 2007; Southall *et al.,* 2019). After examining all of the available data, the authors felt that the derivation of thresholds for behavioral response based solely on exposure level was not supported because context of the animal at the time of sound exposure was an important factor in estimating response. Nonetheless, in some conditions, consistent avoidance reactions were noted at higher sound levels depending on the marine mammal species or group allowing conclusions to be drawn. Phocid seals showed avoidance reactions at or below 190 dB re 1 µPa at 1m; thus, seals may actually receive levels adequate to produce TTS before avoiding the source.

Odontocete behavioral criteria for non-impulsive sources were updated based on controlled exposure studies for dolphins and sea mammals, sonar, and safety (3S) studies where odontocete behavioral responses were reported after exposure to sonar (Antunes *et al.,* 2014; Houser *et al.,* 2013b; Miller *et al.,* 2011; Miller *et al.,* 2014; Miller *et al.,* 2012). For the 3S study, the sonar outputs included 1-2 kHz up- and down-sweeps and 6-7 kHz up-sweeps; source levels were ramped up from 152-158 dB re 1 µPa to a maximum of 198-214 re 1 µPa at 1 m. Sonar signals were ramped up over several pings while the vessel approached the mammals. The study did include some control passes of ships with the sonar off to discern the behavioral responses of the mammals to vessel presence alone versus active sonar.

The controlled exposure studies included exposing the Navy's trained bottlenose dolphins to mid-frequency sonar while they were in a pen. Mid-frequency sonar was played at 6 different exposure levels from 125-185 dB re 1 µPa (rms). The behavioral response function for odontocetes resulting from the studies described above has a 50 percent probability of response at 157 dB re 1 µPa. Additionally, distance cutoffs (20 km

for MF cetaceans) were applied to exclude exposures beyond which the potential of significant behavioral responses is considered to be unlikely.

The pinniped behavioral threshold was updated based on controlled exposure experiments on the following captive animals: hooded seal, gray seal (*Halichoerus grypus*), and California sea lion (Götz *et al.,* 2010; Houser *et al.,* 2013a; Kvadsheim *et al.,* 2010). Hooded seals were exposed to increasing levels of sonar until an avoidance response was observed, while the grey seals were exposed first to a single received level multiple times, then an increasing received level. Each individual California sea lion was exposed to the same received level 10 times. These exposure sessions were combined into a single response value, with an overall response assumed if an animal responded in any single session. The resulting behavioral response function for pinnipeds has a 50 percent probability of response at 166 dB re 1 μPa. Additionally, distance cutoffs (10 km for pinnipeds) were applied to exclude exposures beyond which the potential of significant behavioral responses is considered unlikely. For additional information regarding marine mammal thresholds for PTS and TTS onset, please see NMFS (2018) and Table 6.

Empirical evidence has not shown responses to non-impulsive acoustic sources that would constitute take beyond a few km from a non-impulsive acoustic source, which is why NMFS and the Navy conservatively set distance cutoffs for pinnipeds and mid-frequency cetaceans (U.S. Department of the Navy, 2017a). The cutoff distances for fixed sources are different from those for moving sources, as they are treated as individual sources in Navy modeling given that the distance between them is significantly greater than the range to which environmental effects can occur. Fixed source cutoff distances used were 2.7 nm (5 km) for pinnipeds and 5.4 nm (10 km) for beluga whales (Table 5). As some of the on-site drifting sources could come closer together, the drifting source cutoffs applied were 5.4 nm (10 km) for pinnipeds and 10.8 nm (20 km) for beluga

whales (Table 5). Regardless of the received level at that distance, take is not estimated to occur beyond these cutoff distances. Range to thresholds were calculated for the noise associated with icebreaking in the study area. These all fall within the same cutoff distances as non-impulsive acoustic sources; range to behavioral threshold for both beluga whales and ringed seal were under 2.7 nm (5 km), and range to TTS threshold for both under 15 m (Table 5).

Table 5 -- Thresholds[1] and Cutoff Distances for Sources by Species

Species	Behavioral threshold for non-impulsive acoustic sources	Fixed Source Behavioral Threshold Cutoff Distance[3] (km)	Drifting Source Behavioral Threshold Cutoff Distance [3] (km)	Behavioral threshold for ice breaking sources	Ice Breaking Source Cutoff Distance [3] (km)	TTS Threshold	PTS Threshold
Ringed Seal	Pinniped Dose Response Function[2]	5	10	120 dB re 1 µPa step function	<5	181 dB SEL [4] cumulative	201 dB SEL cumulative
Beluga Whale	Mid-Frequency BRF dose Response Function[2]	10	20	120 dB re 1 µPa step function	<15	178 dB SEL cumulative	198 dB SEL cumulative

1 - The threshold values provided are assumed for when the source is within the animal's best hearing sensitivity. The exact threshold varies based on the overlap of the source and the frequency weighting
2 - See Figure 6-1 in application
3 - Take is not estimated to occur beyond these cutoff distances, regardless of the received level.
4 – SEL= Sound exposure level

Level A harassment – NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) (Technical Guidance, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). ONR's activity includes the use of non-impulsive acoustic sources; however, Level A harassment is not expected as a result of these activities nor is it authorized by NMFS.

These thresholds are provided in the table below. The references, analysis, and methodology used in the development of the thresholds are described in NMFS' 2018 Technical Guidance, which may be accessed at:

www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance.

Table 6 -- Thresholds Identifying the Onset of Permanent Threshold Shift

	PTS Onset Thresholds* (Received Level)	
Hearing Group	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	*Cell 1* $L_{p,0\text{-pk,flat}}$: 219 dB $L_{E,p,\text{LF,24h}}$: 183 dB	*Cell 2* $L_{E,p,\text{LF,24h}}$: 199 dB
Mid-Frequency (MF) Cetaceans	*Cell 3* $L_{p,0\text{-pk,flat}}$: 230 dB $L_{E,p,\text{MF,24h}}$: 185 dB	*Cell 4* $L_{E,p,\text{MF,24h}}$: 198 dB
High-Frequency (HF) Cetaceans	*Cell 5* $L_{p,0\text{-pk,flat}}$: 202 dB $L_{E,p,\text{HF,24h}}$: 155 dB	*Cell 6* $L_{E,p,\text{HF,24h}}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	*Cell 7* $L_{p,0\text{-pk.flat}}$: 218 dB $L_{E,p,\text{PW,24h}}$: 185 dB	*Cell 8* $L_{E,p,\text{PW,24h}}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	*Cell 9* $L_{p,0\text{-pk,flat}}$: 232 dB $L_{E,p,\text{OW,24h}}$: 203 dB	*Cell 10* $L_{E,p,\text{OW,24h}}$: 219 dB

* Dual metric thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds are recommended for consideration.

Note: Peak sound pressure level ($L_{p,0\text{-pk}}$) has a reference value of 1 µPa, and weighted cumulative sound exposure level ($L_{E,p}$) has a reference value of 1µPa^{2}s. In this Table, thresholds are abbreviated to be more reflective of International Organization for Standardization standards (ISO, 2017). The subscript "flat" is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals (*i.e.*, 7 Hz to 160 kHz). The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The weighted cumulative sound exposure level thresholds could be exceeded in a multitude of ways (*i.e.*, varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these thresholds will be exceeded.

Quantitative Modeling

The Navy performed a quantitative analysis to estimate the number of marine mammals that could be exposed to underwater acoustic transmissions above the previously described threshold criteria during this action. Inputs to the quantitative analysis included marine mammal density estimates obtained from the Kaschner *et al.* (2006) habitat suitability model and Cañadas *et al.* (2020), marine mammal depth occurrence (U.S. Department of the Navy, 2017b), oceanographic and mammal hearing data, and criteria and thresholds for levels of potential effects. The quantitative analysis

consists of computer modeled estimates and a post-model analysis to determine the number of potential animal exposures. The model calculates sound energy propagation from the non-impulsive acoustic sources, the sound received by animat (virtual animal) dosimeters representing marine mammals distributed in the area around the modeled activity, and whether the sound received by animats exceeds the thresholds for effects.

The Navy developed a set of software tools and compiled data for estimating acoustic effects on marine mammals without consideration of behavioral avoidance or mitigation. These tools and data sets serve as integral components of the NAEMO. In NAEMO, animats are distributed non-uniformly based on species-specific density, depth distribution, and group size information and animats record energy received at their location in the water column. A fully three-dimensional environment is used for calculating sound propagation and animat exposure in NAEMO. Site-specific bathymetry, sound speed profiles, wind speed, and bottom properties are incorporated into the propagation modeling process. NAEMO calculates the likely propagation for various levels of energy (sound or pressure) resulting from each source used during the training event.

NAEMO then records the energy received by each animat within the energy footprint of the event and calculates the number of animats having received levels of energy exposures that fall within defined impact thresholds. Predicted effects on the animats within a scenario are then tallied and the highest order effect (based on severity of criteria; *e.g.,* PTS over TTS) predicted for a given animat is assumed. Each scenario, or each 24-hour period for scenarios lasting greater than 24 hours is independent of all others, and therefore, the same individual marine mammal (as represented by an animat in the model environment) could be impacted during each independent scenario or 24-hour period. In a few instances, although the activities themselves all occur within the study location, sound may propagate beyond the boundary of the study area. Any

exposures occurring outside the boundary of the study area are counted as if they occurred within the study area boundary. NAEMO provides the initial estimated impacts on marine species with a static horizontal distribution (*i.e.,* animats in the model environment do not move horizontally).

There are limitations to the data used in the acoustic effects model, and the results must be interpreted within this context. While the best available data and appropriate input assumptions have been used in the modeling, when there is a lack of definitive data to support an aspect of the modeling, conservative modeling assumptions have been chosen (*i.e.,* assumptions that may result in an overestimate of acoustic exposures):

- Animats are modeled as being underwater, stationary, and facing the source and therefore always predicted to receive the maximum potential sound level at a given location (*i.e.,* no porpoising or pinnipeds' heads above water);
- Animats do not move horizontally (but change their position vertically within the water column), which may overestimate physiological effects such as hearing loss, especially for slow moving or stationary sound sources in the model;
- Animats are stationary horizontally and therefore do not avoid the sound source, unlike in the wild where animals would most often avoid exposures at higher sound levels, especially those exposures that may result in PTS;
- Multiple exposures within any 24-hour period are considered one continuous exposure for the purposes of calculating potential threshold shift, because there are not sufficient data to estimate a hearing recovery function for the time between exposures; and
- Mitigation measures were not considered in the model. In reality, sound-producing activities would be reduced, stopped, or delayed if marine mammals are detected by visual monitoring.

Due to these inherent model limitations and simplifications, model-estimated results should be further analyzed, considering such factors as the range to specific effects, avoidance, and the likelihood of successfully implementing mitigation measures. This analysis uses a number of factors in addition to the acoustic model results to predict acoustic effects on marine mammals, as described below in the *Marine Mammal Occurrence and Take Estimation* section.

The underwater radiated noise signature for icebreaking in the central Arctic Ocean by CGC *Healy* during different types of ice-cover was characterized in Roth *et al.* (2013). The radiated noise signatures were characterized for various fractions of ice cover. For modeling, the 8/10 and 3/10 ice cover were used. Each modeled day of icebreaking consisted of 16 hours of 8/10 ice cover and 8 hours of 3/10 ice cover. The sound signature of the 5/10 icebreaking activities, which would correspond to half-power icebreaking, was not reported in (Roth *et al.,* 2013); therefore, the full-power signature was used as a conservative proxy for the half-power signature. Icebreaking was modeled for 8 days total. Since ice forecasting cannot be predicted more than a few weeks in advance, it is unknown if icebreaking would be needed to deploy or retrieve the sources after one year of transmitting. Therefore, the potential for an icebreaking cruise on CGC *Healy* was conservatively analyzed within this request for an IHA. As the R/V *Sikuliaq* is not expected to be icebreaking, acoustic noise created by icebreaking is only modeled for the CGC *Healy*. Figures 5a and 5b in Roth *et al.* (2013) depict the source spectrum level versus frequency for 8/10 and 3/10 ice cover, respectively. The sound signature of each of the ice coverage level was broken into 1-octave bins (Table 7). In the model, each bin was included as a separate source on the modeled vessel. When these independent sources go active concurrently, they simulate the sound signature of CGC *Healy*. The modeled source level summed across these bins was 196.2 dB for the 8/10 signature and 189.3 dB for the 3/10 ice signature. These source levels are a good approximation of the

icebreaker's observed source level (provided in Figure 4b of (Roth *et al.,* 2013)). Each frequency and source level was modeled as an independent source, and applied simultaneously to all of the animats within NAEMO. Each second was summed across frequency to estimate sound pressure level (root mean square [SPL_{RMS}]). Any animat exposed to sound levels greater than 120 dB was considered a take by Level B harassment. For PTS and TTS, determinations, sound exposure levels were summed over the duration of the test and the transit to the deep water deployment area. The method of quantitative modeling for icebreaking is considered to be a conservative approach; therefore, the number of takes estimated for icebreaking are likely an overestimate and would not be expected to reach that level.

Table 7 -- Modeled Bins for 8/10 (full power) and 3/10 (quarter power) ice coverage ice breaking on the CGC *Healy*

Frequency (Hz)	8/10 Source Level (dB)	3/10 Source Level (dB)
25	189	187
50	188	182
100	189	179
200	190	177
400	188	175
800	183	170
1600	177	166
3200	176	171
6400	172	168
12800	167	164

For non-impulsive sources, NAEMO calculates the SPL and SEL for each active emission during an event. This is done by taking the following factors into account over the propagation paths: bathymetric relief and bottom types, sound speed, and attenuation contributors such as absorption, bottom loss, and surface loss. Platforms such as a ship using one or more sound sources are modeled in accordance with relevant vehicle

dynamics and time durations by moving them across an area whose size is representative of the testing event's operational area.

Marine Mammal Occurrence and Take Estimation

In this section we provide information about the occurrence of marine mammals, including density or other relevant information that will inform the take calculations. We also describe how the marine mammal occurrence information is synthesized to produce a quantitative estimate of the take that is authorized and reasonably likely to occur.

The beluga whale density numbers utilized for quantitative acoustic modeling are from the Navy Marine Species Density Database (Department of the Navy, 2014). Where available (*i.e.,* June through 15 October over the continental shelf primarily), density estimates used were from Duke density modeling based upon line-transect surveys (Cañadas *et al.,* 2020). The remaining seasons and geographic area were based on the habitat-based modeling by Kaschner *et al.* (2006) and Kaschner (2004). Density for beluga whales was not distinguished by stock and varied throughout the project area geographically and monthly; the range of densities in the project area during September I shown in Table 8. The density estimates for ringed seals are based on the habitat suitability modeling by Kaschner *et al.* (2006) and Kaschner (2004) and shown in Table 8 as well.

Table 8 -- Density estimates of impacted species

Common Name	Density Estimates (animals/km^2)
Beluga whale (Beaufort Sea) Stock	0.000506 to 0.5176
Beluga whale (Eastern Chukchi Sea Stock)	
Ringed seal (Arctic Stock)	0.1108 to 0.3562

Take of all species will occur by Level B harassment only. NAEMO estimated for potential TTS exposure and predicted one exposure of ringed seals may occur as a result of the authorized activities. Table 9 shows the total number of authorized takes by Level

B harassment that NMFS has authorized for both beluga whale stocks and the Arctic ringed seal stock based upon NAEMO modeled results.

Density estimates for beluga whales are equal as estimates were not distinguished by stock (Kaschner *et al.,* 2006; Kaschner, 2004). The ranges of the Beaufort Sea and Eastern Chukchi Sea beluga whales vary within the study area throughout the year (Hauser *et al.,* 2014). Based upon the limited information available regarding the expected spatial distributions of each stock within the study area, take has been apportioned equally to each stock (Table 9). In addition, in NAEMO, animats do not move horizontally or react in any way to avoid sound. Therefore, the current model may overestimate non-impulsive acoustic impacts.

Table 9 -- Authorized take by Level B harassment

Species	Non-Impulsive Active Acoustics (Behavioral)	Icebreaking (Behavioral)	Icebreaking (TTS)	Total Authorized Take	Percentage of Stock Authorized for Take[1]
				Behavioral/TTS	
Beluga whale – Beaufort Sea Stock	134	11	0	145/0	0.369
Beluga whale – Eastern Chukchi Sea Stock	134	11	0	145/0	1.09
Ringed seal	2,839	538	1	3,377/1	1.97

[1] Percentage of stock taken calculated based on proportion of number of Level B takes per the stock population estimate provided in Table 3-1 in the application.

Mitigation

In order to issue an IHA under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable impact on the species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stock for taking for certain subsistence uses. NMFS regulations require applicants for incidental take authorizations to include information about the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting the activity or other means of effecting the least

practicable adverse impact upon the affected species or stocks, and their habitat (50 CFR 216.104(a)(11)). The NDAA for FY 2004 amended the MMPA as it relates to military readiness activities and the incidental take authorization process such that "least practicable impact" shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, NMFS considers two primary factors:

(1) The manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce impacts to marine mammals, marine mammal species or stocks, and their habitat, as well as subsistence uses. This considers the nature of the potential adverse impact being mitigated (likelihood, scope, range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), the likelihood of effective implementation (probability implemented as planned), and;

(2) The practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations, and, in the case of a military readiness activity, personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Mitigation for Marine Mammals and their Habitat

The Navy will be required to abide by the mitigation measures below. These measures are expected to: further minimize the likelihood of ship strikes; reduce the likelihood that marine mammals are exposed to sound levels during acoustic source deployment that would be expected to result in TTS or more severe behavioral responses

and also to ensure that there are no other interactions between the deployed gear and marine mammals, and further ensure that there are no impacts to subsistence uses.

Ships operated by or for the Navy are required to have at least one personnel assigned to stand watch at all times, day and night, when moving through the water. Watch personnel must be trained through the U.S. Navy Marine Species Awareness Training Program, which standardizes watch protocols and trains personnel in marine species detection to prevent adverse impacts to marine mammal species. While in transit, ships must be alert at all times, use extreme caution and proceed at a safe speed such that the ship can take proper and effective action to avoid a collision with any marine mammals.

During mooring or UUV deployment, visual observation will start 15 minutes prior to and continue throughout the deployment within the mitigation zone of 180 ft (55 m, roughly one ship length) around the deployed mooring. Deployment will stop if a marine mammal is visually detected within the exclusion zone. Deployment will re-commence if any one of the following conditions are met: (1) The animal is observed exiting the exclusion zone, (2) the animal is thought to have exited the exclusion zone based on its course and speed, or (3) the exclusion zone has been clear from any additional sightings for a period of 15 minutes for pinnipeds and 30 minutes for cetaceans.

Ships will avoid approaching marine mammals head-on and will maneuver to maintain a mitigation zone of 500 yards (yd; 457 m) around observed cetaceans, and 200 yd (183 m) around all other marine mammals, provided it is safe to do so in ice-free waters. Ships captains and subsistence whalers will also maintain at-sea communication to avoid conflict of ship transit with hunting activity.

If a marine mammal species for which take is not authorized is encountered or observed within the mitigation zone, or a species for which authorization was granted but

the authorized number of takes have been met, activities must cease. Activities may not resume until the animal is confirmed to have left the area.

These requirements do not apply if a vessel's safety is at risk, such as when a change of course would create an imminent and serious threat to safety, person, or vessel, and to the extent that vessels are restricted in their ability to maneuver. No further action is necessary if a marine mammal other than a cetacean continues to approach the vessel after there has already been one maneuver and/or speed change to avoid the animal. Avoidance measures should continue for any observed cetacean in order to maintain a mitigation zone of 500 yd (457 m).

Based on our evaluation of the applicant's measures, NMFS has determined that the mitigation measures provide the means of effecting the least practicable impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for subsistence uses.

Monitoring and Reporting

In order to issue an IHA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present while conducting the activities. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring.

Monitoring and reporting requirements prescribed by NMFS should contribute to improved understanding of one or more of the following:

- Occurrence of marine mammal species or stocks in the area in which take is anticipated (*e.g.*, presence, abundance, distribution, density);
- Nature, scope, or context of likely marine mammal exposure to potential stressors/impacts (individual or cumulative, acute or chronic), through better understanding of: (1) action or environment (*e.g.*, source characterization, propagation, ambient noise); (2) affected species (*e.g.*, life history, dive patterns); (3) co-occurrence of marine mammal species with the action; or (4) biological or behavioral context of exposure (*e.g.*, age, calving or feeding areas);
- Individual marine mammal responses (behavioral or physiological) to acoustic stressors (acute, chronic, or cumulative), other stressors, or cumulative impacts from multiple stressors;
- How anticipated responses to stressors impact either: (1) long-term fitness and survival of individual marine mammals; or (2) populations, species, or stocks;
- Effects on marine mammal habitat (*e.g.*, marine mammal prey species, acoustic habitat, or other important physical components of marine mammal habitat); and,
- Mitigation and monitoring effectiveness.

While underway, the ships (including non-Navy ships operating on behalf of the Navy) utilizing active acoustics will have at least one watch person during activities. Watch personnel must undertake extensive training through the Navy's Marine Species Awareness Training. Their duties may be performed in conjunction with other job responsibilities, such as navigating the ship or supervising other personnel. While on watch, personnel will employ visual search techniques, including the use of binoculars, using a scanning method in accordance with the U.S. Navy Marine Species Awareness

Training or civilian equivalent. A primary duty of watch personnel is to detect and report all objects and disturbances sighted in the water that may be indicative of a threat to the ship and its crew, such as debris, or surface disturbance. Per safety requirements, watch personnel also report any marine mammals sighted that have the potential to be in the direct path of the ship as a standard collision avoidance procedure.

While underway, the ships (including non-Navy ships operating on behalf of the Navy) utilizing active acoustics and towed in-water devices will have at least one watch person during activities. While underway, watch personnel must be alert at all times and have access to binoculars. Each day, the following information will be recorded:

- Vessel name;
- Watch personnel names and affiliations;
- Effort type (*i.e.,* transit or deployment); and
- Environmental conditions (at the beginning of watch personnel shift and whenever conditions changed significantly), including Beaufort Sea State and any other relevant weather conditions including cloud cover, fog, sun glare, and overall visibility to the horizon.

Watch personnel must use standardized data collection forms, whether electronic or hard copy, as well as distinguish between marine mammal sightings that occur during ship transit or acoustic source deployment. Watch personnel must distinguish between sightings that occur on transit, during deployment of acoustic sources, and during ice breaking. Data must be recorded on all days of activities even if marine mammals are not sighted.

Upon visual observation of a marine mammal, the following information will be recorded:

- Date/time of sighting;

- Identification of animal (*e.g.*, genus/species, lowest possible taxonomic level, or unidentified) and the composition of the group if there is a mix of species;
- Location (latitude/longitude) of sighting;
- Estimated number of animals (high/low/best)
- Description (as many distinguishing features as possible of each individual seen, including length, shape, color, pattern, scars or markings, shape and size of dorsal fin, shape of head, and blow characteristics);
- Detailed behavior observations (*e.g.*, number of blows/breaths, number of surfaces, breaching, spyhopping, diving, feeding, traveling; as explicit and detailed as possible; length of time the animal was observed within the harassment zone; note any observed changes in behavior);
- Distance from ship to animal;
- Direction of animal's travel relative to the vessel
- Platform activity at time of sighting (*i.e.,* transit, deployment); and
- Weather conditions (*i.e.,* Beaufort Sea State, cloud cover).

During ice breaking, the following information must be recorded:

- Start and end time of ice breaking; and
- Ice cover conditions.

The U.S. Navy has coordinated with NMFS to develop an overarching program plan in which specific monitoring would occur. This plan is called the Integrated Comprehensive Monitoring Program (ICMP) (Department of the Navy, 2011). The ICMP has been developed in direct response to Navy permitting requirements established through various environmental compliance efforts. As a framework document, the ICMP applies by regulation to those activities on ranges and operating areas for which the Navy is seeking or has sought incidental take authorizations. The ICMP is intended to

coordinate monitoring efforts across all regions and to allocate the most appropriate level and type of effort based on a set of standardized research goals, and in acknowledgement of regional scientific value and resource availability.

The ICMP is focused on Navy training and testing ranges where the majority of Navy activities occur regularly as those areas have the greatest potential for being impacted. ONR's ARA in comparison is a less intensive test with little human activity present in the Arctic. Human presence is limited to the deployment of sources that will take place over several weeks. Additionally, due to the location and nature of the testing, vessels and personnel will not be within the study area for an extended period of time. As such, more extensive monitoring requirements beyond the basic information being collected will not be feasible as it would require additional personnel and equipment to locate seals and a presence in the Arctic during a period of time other than what is planned for source deployment. However, ONR will record all observations of marine mammals, including the marine mammal's species identification, location (latitude and longitude), behavior, and distance from project activities. ONR will also record date and time of sighting. This information is valuable in an area with few recorded observations.

If any injury or death of a marine mammal is observed during the 2022-2023 ARA, the Navy will immediately halt the activity and report the incident to the Office of Protected Resources (OPR), NMFS, and the Alaska Regional Stranding Coordinator, NMFS. The following information must be provided:

- Time, date, and location of the discovery;
- Species identification (if known) or description of the animal(s) involved;
- Condition of the animal(s) (including carcass condition if the animal is dead);
- Observed behaviors of the animal(s), if alive;
- If available, photographs or video footage of the animal(s); and

- General circumstances under which the animal(s) was discovered (*e.g.,* deployment of moored or drifting sources or by transiting vessel).

ONR will provide NMFS, OPR, and Alaska Regional Office (AKR) with a draft monitoring report within 90 days of the conclusion of each research cruise, or 60 days prior to the issuance of any subsequent IHA for this project, whichever comes first. All monitoring reports must be reviewed and checked for accuracy prior to submission to NMFS. The draft monitoring report will include data regarding acoustic source use and any mammal sightings or detection documented. The report will include the estimated number of marine mammals taken during the activity. The report will also include information on the number of shutdowns recorded. If no comments are received from NMFS within 30 days of submission of the draft final report, the draft final report will constitute the final report. If comments are received, a final report must be submitted within 30 days after receipt of comments.

Negligible Impact Analysis and Determination

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.*, population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be "taken" through harassment, NMFS considers other factors, such as the likely nature of any impacts or responses (*e.g.*, intensity, duration), the context of any impacts or responses (*e.g.*, critical reproductive time or location, foraging impacts affecting energetics), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by

evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS' implementing regulations (54 FR 40338, September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the baseline (*e.g.*, as reflected in the regulatory status of the species, population size and growth rate where known, ongoing sources of human-caused mortality, or ambient noise levels).

To avoid repetition, the discussion of our analysis applies to beluga whales and ringed seals, given that the anticipated effects of this activity on these different marine mammal stocks are expected to be similar. Where there are meaningful differences between species or stocks, or groups of species, in anticipated individual responses to activities, impact of expected take on the population due to differences in population status, or impacts on habitat, they are described independently in the analysis below.

Underwater acoustic transmissions associated with ONR's ARA, as outlined previously, have the potential to result in Level B harassment of beluga whales and ringed seals in the form of behavioral disturbances. No serious injury, mortality, or Level A harassment are anticipated to result from these described activities. Effects on individual belugas or ringed seals taken by Level B harassment could include alteration of dive behavior and/or foraging behavior, effects to breathing rates, interference with or alteration of vocalization, avoidance, and flight. More severe behavioral responses are not anticipated due to the localized, intermittent use of active acoustic sources. However, exposure duration is likely to be short-term and individuals will, most likely, simply be temporarily displaced by moving away from the acoustic source. Exposures are, therefore, unlikely to result in any significant realized decrease in fitness for affected individuals or adverse impacts to stocks as a whole.

Arctic ringed seals are listed as threatened under the ESA. The primary concern for Arctic ringed seals is the ongoing and anticipated loss of sea ice and snow cover

resulting from climate change, which is expected to pose a significant threat to ringed seals in the future (Muto *et al.*, 2022). In addition, Arctic ringed seals have also been experiencing an Unusual Mortality Event (UME) since 2019 although the cause of the UME is currently undetermined. As mentioned earlier, no mortality or serious injury to ringed seals is anticipated nor authorized. Due to the short-term duration of expected exposures and required mitigation measures to reduce adverse impacts, we do not expect the ARA to affect annual rates of ringed seal survival and recruitment that may threaten population recovery or exacerbate the ongoing UME.

A small portion of the ARA study area overlaps with ringed seal critical habitat. Although this habitat contains features necessary for ringed seal formation and maintenance of subnivean birth lairs, basking and molting, and foraging, these features are also available throughout the rest of the designated critical habitat area. Displacement of ringed seals from the ARA study area would likely not interfere with their ability to access necessary habitat features. Therefore, we expect minimal impacts to any displaced ringed seals as similar necessary habitat features would still be available nearby.

The ARA study area also overlaps with a beluga whale migratory Biologically Important Area (BIA). Due to the small amount of overlap between the BIA and the ARA study area, as well as the low intensity and short-term duration of acoustic sources and required mitigation measures, we expect minimal impacts to migrating belugas. Shutdown zones will reduce the potential for Level A harassment of belugas and ringed seals, as well as the severity of any Level B harassment. The requirements of trained dedicated watch personnel and speed restrictions will also reduce the likelihood of any ship strikes to migrating belugas.

In all, ONR's ARA are expected to have minimal adverse effects on marine mammal habitat. While the activities may cause some fish to leave the area of disturbance, temporarily impacting marine mammals' foraging opportunities, this would

encompass a relatively small area of habitat leaving large areas of existing fish and marine mammal foraging habitat unaffected. As such, the impacts to marine mammal habitat are not expected to impact the health or fitness of any marine mammals.

In summary and as described above, the following factors primarily support our determination that the impacts resulting from this activity are not expected to adversely affect any of the species or stocks through effects on annual rates of recruitment or survival:

- No serious injury or mortality is anticipated or authorized;
- Impacts will be limited to Level B harassment only;
- Only temporary behavioral modifications are expected to result from these activities;
- Impacts to marine mammal prey or habitat will be minimal and short-term.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the monitoring and mitigation measures, NMFS finds that the total marine mammal take from the authorized activity will have a negligible impact on all affected marine mammal species or stocks.

Unmitigable Adverse Impact Analysis and Determination

In order to issue an IHA, NMFS must find that the specified activity will not have an "unmitigable adverse impact" on the subsistence uses of the affected marine mammal species or stocks by Alaskan Natives. NMFS has defined "unmitigable adverse impact" in 50 CFR 216.103 as an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently

mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

Subsistence hunting is important for many Alaska Native communities. A study of the North Slope villages of Nuiqsut, Kaktovik, and Utqiaġvik (formerly Barrow) identified the primary resources used for subsistence and the locations for harvest (Stephen R. Braund & Associates, 2010), including terrestrial mammals (caribou, moose, wolf, and wolverine), birds (geese and eider), fish (Arctic cisco, Arctic char/Dolly Varden trout, and broad whitefish), and marine mammals (bowhead whale, ringed seal, bearded seal, and walrus). Ringed seals and beluga whales are likely located within the project area during this action, yet the action will not remove individuals from the population nor behaviorally disturb them in a manner that would affect their behavior more than 100 km farther inshore where subsistence hunting occurs. The permitted sources will be placed far outside of the range for subsistence hunting. The closest active acoustic source (fixed or drifting) within the project site that is likely to cause Level B take is approximately 110 nm (204 km) from land. This ensures a significant standoff distance from any subsistence hunting area. The closest distance to subsistence hunting (70 nm, or 130 km) is well the largest distance from the sound sources in use at which behavioral harassment would be expected to occur (20 km) described above. Furthermore, there is no reason to believe that any behavioral disturbance of beluga whales or ringed seals that occurs far offshore (we do not anticipate any Level A harassment) would affect their subsequent behavior in a manner that would interfere with subsistence uses should those animals later interact with hunters.

In addition, ONR has been communicating with the Native communities about the action. The ONR chief scientist for AMOS gave a virtual briefing on ONR research planned for 2022-2023 at the Alaska Eskimo Whaling Commission (AEWC) meeting in February 2022. This briefing communicated the lack of effect on subsistence hunting due

to the distance of the sources from hunting areas. ONR scientists also attend Arctic Waterways Safety Committee (AWSC) and AEWC meetings regularly to discuss past, present, and future ARA. While no take is anticipated to result during transit, points of contact for at-sea communication will also be established between ship captains and whalers to avoid any conflict of ship transit with hunting activity.

Based on the description of the specified activity, distance of the study area from subsistence hunting grounds, the measures described to minimize adverse effects on the availability of marine mammals for subsistence purposes, and the planned mitigation and monitoring measures, NMFS has determined that there will not be an unmitigable adverse impact on subsistence uses from ONR's planned ARA.

Peer Review of the Monitoring Plan - The MMPA requires that monitoring plans be independently peer reviewed where the activity may affect the availability of a species or stock for taking for subsistence uses (16 U.S.C. 1371(a)(5)(D)(ii)(III)). Given the factors discussed above, NMFS has also determined that the activity is not likely to affect the availability of any marine mammal species or stock for taking for subsistence uses, and therefore, peer review of the monitoring plan is not warranted for this project.

Endangered Species Act

Section 7(a)(2) of the Endangered Species Act of 1973 (ESA: 16 U.S.C. 1531 *et seq*.) requires that each Federal agency insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. To ensure ESA compliance for the issuance of IHAs, NMFS consults internally whenever we propose to authorize take for endangered or threatened species, in this case with AKR.

There is one marine mammal species (Arctic ringed seal) with confirmed occurrence in the study area that is listed as threatened under the ESA. The NMFS Alaska

Regional Office of Protected Resources Division issued a Biological Opinion on September 13, 2022 under section 7 of the ESA, on the issuance of an IHA to ONR under section 101(a)(5)(D) of the MMPA by the NMFS Permits and Conservation Division. The Biological Opinion concluded that the action is not likely to jeopardize the continued existence of Arctic ringed seals, and is not likely to destroy or adversely modify Arctic ringed seal critical habitat.

National Environmental Policy Act

In compliance with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*.) as implemented by the regulations published by the Council on Environmental Quality (CEQ) (40 CRF parts 1500-1508), ONR prepared an Overseas Environmental Assessment (OEA) to consider the direct, indirect, ad cumulative effects to the human environment resulting from the ARA project. In compliance with NEPA and the CEQ regulations, as well as NOAA Administrative Order 216-6A, NMFS has reviewed ONR's OEA, determined it to be sufficient, and adopted that OEA and signed a Finding of Significant Impact (FONSI) on September 13, 2022.

Authorization

NMFS has issued an IHA to ONR for the potential harassment of small numbers of two species of marine mammals incidental to ARA in the Beaufort Sea and eastern Chukchi Sea, provided the previously mentioned mitigation, monitoring, and reporting requirements are followed.

Dated: September 14, 2022.

Kimberly Damon-Randall,

Director, Office of Protected Resources,

National Marine Fisheries Service.

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